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DETECTION AND INCIDENCE OF TIP BLIGHT OF LOBLOLLY PINE AT THE W.W. ASHE NURSERY

SOUTHEASTERN AREA, STATE & PRIVATE FORESTRY
USDA FOREST SERVICE, ATLANTA, GA. 30367

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DETECTION AND INCIDENCE OF TIP BLIGHT OF LOBLOLLY PINE AT THE W.W. ASHE NURSERY

by

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ABSTRACT

In a survey of the W.W. Ashe Nursery's loblolly and slash pine crop in the fall of 1979, tip blight was found to occur on from 0-9% (mean 1.5%) of the seedlings in the 9 bed blocks between irrigation lines. A simplified benefit/cost analysis is presented to evaluate the need for fungicidal spray. Based on current values benefit of benlate treatment was found to equal cost at only a 0.6% tip blight incidence where blighted seedlings were culled.

INTRODUCTION

Tip blight attacks the terminals and occasionally the laterals of southern pine nursery seedlings. Based on greenhouse and field observations it is believed that only two to three inches of the terminal is affected. Needles around the terminal leader at first redden, then the stem of the terminal is attacked and may crook.

In early August of 1979, a tip blight attacked loblolly and slash pine seedlings at a federal nursery in south Mississippi. This problem had been present in nurseries in east Texas in 1978. Presently, it is found in nurseries in at least seven states of the south.

W. W. Ashe nursery personnel applied benlate then daconil sprays in the hope of retarding disease progress. By December 1979, infected sprayed seedlings were difficult to separate from healthy seedlings.

Researchers at the Southeastern Forest Experiment Station have been successful in inducing a similar disease by inoculation with a Diplodia sp. (Rowan, personal communication). Diplodia pinea (Desm.) Kickx has been reported from a federal nursery on Austrian pine in Kansas (Slagg and Wright, 1943).

Recently, economical chemical control measures have become available for use in forest tree nurseries (Peterson, 1978).

A disease detection survey was conducted in October 1979 to determine: (1) actual disease incidence on loblolly pine at the Ashe Nursery, (2) how many samples would be necessary to indicate the incidence of tip blight, and (3) to relate this to cost-benefit figures to decide whether spraying was justified.

MATERIALS AND METHODS

Since the incidence was roughly estimated to be less than 10 percent, a systematic sample which gives the best chance of detecting a low incidence was chosen (Ryan, written communication). Samples taken at given intervals would require the most conservative number of samples, but would give the best estimate of the true incidence of the disease.

Only loblolly seedlings at Ashe Nursery were sampled. A gridwork of hardware cloth was fashioned by cutting out wire squares 2½" on a side (6 x 21 squares). The 100 intersections (5 x 20) sampled an area one by four feet in dimension, equalling the 100 seedlings/linear foot of nursery bed (25 seedlings/ft^2). Thus, ideally, each intersection in the grid would be located above a seedling when the grid was laid across the nursery bed. From the 100 intersections, ten were selected (using a random number table) and marked. Seedlings directly under or closest to marked intersections were evaluated for presence/absence of tip blight. Each sample which was taken had 10 seedlings in it.

A large number of samples at the rate of 200 to 800 were taken per 9 beds between irrigation lines (block). Thirty-nine blocks of loblolly pine were sampled. Five were sampled at the rate of 800, and 34 at the rate of 200 samples per block. The samples in each block were taken at regular intervals; 1/200th or 1/800th of total length of nursery beds within the block.

RESULTS

Irrigation lines referred to as compartment-blocks in the analysis varied greatly in disease incidence. Incidence ranged from 0-9 percent with an average of approximatley 1.5 percent. Table 1 lists all the blocks and the mean observed disease incidence.

Using a maximum mean incidence of 5 percent, since only one mean incidence is above this , calculation of sample sizes at the 68 and 90 percent confidence levels (with 5% relative error) indicated that only 19 and 52 samples per block, respectively, (Ryan, written communication) would be needed.

Assuming that culling was warranted, protective fungicidal sprays might be indicated. A cost-benefit analysis was performed to determine at what mean incidence the cost of benlate sprays would balance the benefit of not culling seedings. This general formula was used:

Total Cost = Costs of fungicide + labor + (maintenance)
Total Cost = 128 lbs. benlate x $10 per pound + 90 manhours x

$7 per hour + $3.97/day x 11.2 days (tractor maintenance) + 12 gallons gas per spray x $1.10 per gallon x 9 sprays (weekly during August and September) + $1/spray x 9 sprays (sprayer maintenance).
Total Cost = $1280 + 630 + (44 + 119 + 9) = $2082

Since loblolly pine sells for approximately $30 per thousand, the following formulae show how many thousands of loblolly can be lost (L) and what percentage of the expected 12 million loblolly in 1980 can be lost before cost equals benefit, the benefit being seedlings that need not be culled because of spraying.

$30 L = $2082
L = 69.4 (thousands of seedlings)

Ashe Nursery currently produces about 12 million loblolly pine seedings per year.

69.4 = 0.6 percent, the cost of benlate is justified by the saved seedling value.

DISCUSSION

The survey method provides the Ashe Nursery and other nurseries with a simple procedure for sampling for tip blight and deciding whether to control it. Depending on whether nursery personnel want the true incidence of the disease 2 out of 3 or 9 of 10 times, 19 or 52 samples respectively, should be taken between each pair of irrigation lines. If the resulting mean incidence is greater than 0.6 percent, based on our simplified analysis, benlate sprays at 8 ounces A.I. per 100 gallons and 100 gallons per acre would be applied to the affected seedlings between the irrigation lines. Spraying would be performed in August and September at weekly intervals. Remember that while 0.6% has been used in this example based on current information, a benefit cost analysis must be run when spraying is being considered since costs and values vary.

In a related evaluation, survival of outplanted seedlings is being determined. The decision to spray above was based on the assumption that tip blighted seedlings were culled. Should the collateral evaluation indicate no survival or growth differences between diseased and disease free trees, a re-evaluation of the 0.6% threshold will be made.

REFERENCES CITED

Peterson, G. W. 1978. Effective and economical methods for controlling Diplodia tip blight. American Nurseryman 147 (1): 13,66,70,72.

Slagg, C. M. and E. Wright 1943. Diplodia blight in coniferous seedbeds. Phytopathology 33: 390-393.

Table 1. Incidence of tip blight of loblolly pine by compartment-block and direction at the W.W. Ashe Nursery - October 1979.

Compartment-Block	Mean Incidence (Percent)
1-1	1.05
1-2	1.20
1-3 EW	.89
1-4	.20
1-6 EW	.53
1-7 EW	.50
1-8 EW	.20
1-9	0.00
1-10	.20
1-3 NS	.10
1-6 NS	.50
1-7 NS	.10
1-8 NS	.30
2-6	.10
2-7	1.21
2-8	2.75
5-1	.32
5-2	.90
5-3	1.60
5-5	2.00
5-6	.40
5-7	0.00
5-8	.50
5-9	.30
5-12	.85
5-14	0.10
5-15	0.10
5-16	2.65
5-17	2.80
6-8	1.05
6-11	0.80
6-12	3.05
6-13	8.80
6-14	0.90
6-15	0.20
6-16	0.40
6-17	0.95
7-9	1.20
7-10	4.00

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